

REMARKS

Claims 1-22 were pending. Over Applicants' traversal, claims 1-6 and 15-21 have been withdrawn by the Examiner pursuant to 37 C.F.R. § 1.142(b) as being drawn to a non-elected invention. Claims 10 and 22 have been amended, claims 7-9 canceled, and new claims 23-24 added. The new claims and amendments are fully supported by the specification, claims and drawings as originally filed, and thus do not constitute new matter.

As such, claims 1-6 and 10-24 are pending. A marked-up version of the amended claims, in which deleted text is indicated by square brackets and added text is indicated by underlining, is attached hereto as Exhibit A. A clean version of the pending claims, as amended, is attached hereto as Exhibit B.

The Restriction Requirement

In a telephone call to Applicants on May 22, 2002, in which the Examiner presented a restriction requirement, Applicants made a provisional election with traverse to prosecute the invention of Group II. Pursuant to 37 C.F.R. § 1.142(b), the Examiner has withdrawn claims 1-6 and 15-21 from consideration as allegedly being directed to a non-elected invention (Office Action at § 4).

The Examiner asserts that restriction to one of the following inventions is required under 35 U.S.C. § 121:

- I. Claims 1-6 and 15-21 drawn to a process of coating carbon black, classified in class 427, subclass 212; and

- II. Claims 714 and 22, drawn to a modified carbon black, classified in class 428, subclass 408.

The Office Action states that the inventions are distinct because, although the inventions of Groups I and II are related as process of making and product made, the product as claimed allegedly can be made by another materially different process (Office Action at §§ 1-2).

Applicants respectfully traverse and, as required by 37 C.F.R. § 1.143, indicate a provisional election of one invention for prosecution, hereby affirming the election of Group II. However, Applicants note that the process described in U.S. Patent No. 6,090,880 does not result in a modified carbon black of the instant invention.

The Office Action also suggests that the inventions of Groups I and II are distinct because each has acquired a separate status in the art as shown by their different classification (Office Action at § 3). Nevertheless, there are two criteria for a proper requirement for restriction: (1) the inventions must be independent or distinct as claimed; and (2) a search and examination of the claims would necessarily impose be a serious burden on the examiner. M.P.E.P. § 803. Indeed, if the search and examination of an entire application can be made without serious burden, the examiner must examine all claims on the merits, even though the application includes claims to independent or distinct inventions. M.P.E.P. § 803.

Applicants respectfully assert that examination of the instantly claimed subject matter would not impose a serious burden on the Examiner. The process claims of Group I and the product claims of Group II are so intimately related such that searching and examining the claims together would not pose a serious burden. Accordingly, Applicants respectfully request

reconsideration and withdrawal of the restriction requirement in accordance with 37 C.F.R. § 1.143. Applicants hereby preserve their right of petition from requirement for restriction under 37 C.F.R. § 1.144.

Rejections Under 35 U.S.C. § 102

Claims 7-9 are rejected under 35 U.S.C. § 102(e), as allegedly being anticipated by U.S. Patent No. 6,090,880 to Zimmer et al. Claims 7-8 are also rejected under 35 U.S.C. § 102(b), as allegedly being anticipated by DE 3502494 to Sugiura et al. (Office Action at §§ 7-9).

Claims 7-9 have been canceled without prejudice to Applicants' right to pursue the canceled subject matter in other applications. As such, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 102.

Rejections Under 35 U.S.C. § 103(a)

Claims 10-14 and 22 are rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 6,090,880 to Zimmer et al. ("Zimmer") in view of U.S. Patent No. 4,590,039 to Cheng ("Cheng") (Office Action at §§ 10-14). Applicants respectfully traverse.

The present invention relates to a composition, specifically a novel, modified carbon black which has (1) at least a partial coat of aluminum oxide and/or aluminum hydroxide; (2) a BET surface area of 30-400 m²/g; (3) an average particle size of 20-400 nm; and (4) an ultrasound disagglomeration rate greater 1x10⁻³ μm⁻¹/s. The Office Action admits that Zimmer fails to disclose the ultrasound disagglomeration rate of the carbon black (Office Action at § 14).

Applicants note that, as a whole, Zimmer is directed to silanol-modified or siloxane-modified carbon black. Indeed, Zimmer specifies that it is the interaction between the silanol groups on the surface of the modified carbon black (comprising a tin coupled or capped elastomer and the alkoxysilane) which, in fact, confers enhanced physical properties to a rubber composition (Zimmer at col. 5, lines 46-58). Thus, Zimmer's assertion that a crucial aspect of the invention is the presence of silanol groups indeed teaches away from using non-siliceous moieties to modify the carbon black. Further, the examples offered by Zimmer illustrate a carbon black that is treated with tetraethoxysilane to achieve a silanol content of 0.75 SiOH/nm^2 . Notably, the tested surface-modified carbon black lacks aluminum hydroxide.

Modification of carbon black with siliceous moieties is not equivalent to modification of carbon black with aluminous hydroxide. Yet, Zimmer teaches that "the modified carbon blacks may be prepared by various means to provide the aforesaid moieties on their surface. For example, the carbon black may be treated by sodium silicate solution forming a silicate structure as described in EP-A1-711 805" (Zimmer at col. 2, lines 37-41). The EP-A1-711 805 document, however, teaches only how to prepare carbon black coated with a siliceous layer, *i.e.*, encompassing the siloxane and silanol of Zimmer, and is readily distinguishable from the present invention (*see, e.g.*, instant specification at page 5, lines 9-21 stating that carbon blacks coated with aluminous surface layers formed of aluminum oxides and/or hydroxides are superior to the prior art siliceous-coated carbon blacks).

Rather, it is the present specification which teaches that aluminous surface layers formed of aluminum oxides and/or hydroxides are more stable and chemically more reactive than silicon oxides, such that the aluminous surface layers better adhere to carbon black and are

more reactive than siliceous layers of modified carbon blacks (*see* specification at page 5, lines 14-17).

Zimmer refers to the EP-A1-711 805 document to support the process of making a silanol/siloxane-modified carbon black. This document is directed to silica surface-treated carbon black. The process to prepare the modified carbon black in this document states "that carbon black is made to disperse in water, followed by adjusting the pH to at least 6, . . . , maintaining the temperature to at least 70°C, . . . , and during that time, causing, for example, sodium silicate to hydrolyze to cause amorphous silica to adhere to or deposit on the surface of the particles of carbon black" (page 3, lines 14-17). If Zimmer adopts this method to deposit and adhere siloxane and/or silanol groups on the surface, then the coating of the carbon black also comprises silica. The presence of silica on the surface of the carbon black thus is inherent to the presence of silanol/siloxane groups.

In contrast, the deposition of an aluminous layer on the surface of carbon black unexpectedly results in significantly improved workability and reinforcing effect. Comparative tests between compositions comprising silica surface-treated carbon black and compositions comprising carbon black having aluminous surface layers, readily demonstrate the significant technical advantages of the compositions of the invention, which relates to carbon black coated with aluminous layers (*see* Declaration of Arnaud LAPRA). Importantly, these data also demonstrate that, contrary to the teachings of Zimmer, carbon black having aluminous surface layers is not equivalent to silica surface-treated carbon black.

Tests were conducted to compare the physical properties of a conventional reinforcing filler of untreated carbon black N234 (control), a carbon black having aluminous surface layers of the invention, and a conventional, silica-treated carbon black. The results show that the Mooney plasticity value is significantly lower for compositions containing the aluminum oxide and/or hydroxide-coated carbon black of the invention compared to compositions containing untreated carbon black, which is indicative of the excellent workability of aluminum oxide and/or hydroxide-coated carbon black to be worked in the uncured state (*see* Declaration of Arnaud LAPRA).

In direct contrast, the silica-treated composition demonstrated significantly inferior workability in the uncured state, with a greater than 25% increase compared to the control, thus reflecting increased rigidity of the composition. This compromised workability is unacceptable at the industrial level (*see* Declaration of Arnaud LAPRA).

The comparative tests also demonstrate the much stronger interaction between the rubber and filler when using aluminum oxide and/or hydroxide-coated carbon black than when using silica-treated carbon black. The strong interaction observed with the aluminum oxide and/or hydroxide-coated carbon black represents a very significant increase in the reinforcing properties of the filler. This enhanced reinforcing property is an unexpected and surprising result when viewed by a person of ordinary skill in the art. Moreover, the aluminum oxide and/or hydroxide-coated carbon black provides a critical technical advantage, resulting in better wear resistance of a tire having incorporated this novel, modified carbon black (*see* Declaration of Arnaud LAPRA).

Cheng is cited for teaching a carbon black having an average particle size ranging from 20-30 nm (Office Action at § 14). However, a *prima facie* case of obviousness requires a showing of suggestion or motivation, either in the cited reference or in the ordinary knowledge of those skilled in the art, to modify the cited reference so as to arrive at the claimed invention. *See, e.g., In re Rouffet*, 149 F.3d 1350, 1355, 47 U.S.P.Q.2d 1453, 1456 (Fed. Cir. 1998) (finding failure to make a *prima facie* case of obviousness absent any evidence of teaching, suggestion or motivation to meet the claimed invention); *see also* M.P.E.P. § 2143. Applicants point out that no teaching or suggestion has been identified within Zimmer or Cheng to combine their respective teachings to arrive at the claimed invention. As such, a *prima facie* case of obvious has not been established, and withdrawal of the rejection is respectfully requested.

Moreover, Cheng does not even relate to rubber reinforcement or even to surface-treated carbon black. Rather, Cheng relates to aerosol separating techniques such as the separation of carbon black particles from carbon black containing smoke. (Cheng, col. 1, lines 8-13). There is no teaching or suggestion that one skilled in the art of making rubber composition would look to a patent directed toward aerosol separating techniques for smoke containing carbon black to arrive at the claimed invention.

Applicants further stress that the particle size recited in Cheng and relied upon by the examiner is the particle size of carbon black in smoke prior to entering an auto-preseparation zone. ("The particle size of carbon black in the smoke entering the auto-preseparation zone is approximately 0.01 to 0.5 microns; typical small particle black such as N110 has an average particle diameter of 0.02 to 0.03 microns." Cheng, col. 4, lines 14-17). There is no teaching in Cheng of carbon black having the claimed size limitations in any form other than as a particle in

smoke. Nor is there any teaching or suggestion that one skilled in the art of making rubber compositions would look to smoke containing carbon black to produce a rubber composition. Thus, Cheng does not teach carbon black having the claimed size limitations in a form that would be used in making a rubber composition. As such, the combination of Cheng and Zimmer cannot render the claimed invention obvious.

Additionally, although Zimmer admittedly fails to disclose the ultrasound disagglomeration rate of the carbon black, the Office Action states that "it is within the level of one having ordinary skill in the art to determine such a property" (Office Action at § 14). Thus, the Office Action relies on the skilled artisan to supply the suggestion to modify Zimmer such that the ultrasound disagglomeration rate is greater than $1 \times 10^{-3} \mu\text{m}^{-1}/\text{s}$, and then further relies on the skilled artisan to supply the suggestion to combine Cheng and Zimmer to meet the claimed invention. Again, the assertion that it would have been obvious to so modify Zimmer and Cheng to arrive at the instant invention is not sufficient to establish a *prima facie* case of obviousness without some objective reason to so modify the prior art references. *See* M.P.E.P. § 2143.01. The level of skill in the art simply cannot be relied upon to provide the suggestion to combine the prior art references. *See Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 U.S.P.Q.2d 1161 (Fed. Cir. 1999); *see also* M.P.E.P. § 2143.01. Therefore, since nothing in the prior art has been offered to suggest modifying the cited references, the claims cannot be obvious in view of Zimmer or Cheng, either alone or in combination.

Additionally, to the extent that the Office Action is asserting that the ultrasound disagglomeration rate of the carbon black of Zimmer would inherently have an ultrasound

disagglomeration rate greater than $1 \times 10^{-3} \mu\text{m}^{-1}/\text{s}$, applicants note if "relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. M.P.E.P. § 2112. The fact that a "certain characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. M.P.E.P. § 2112. Here, the Office Action provides no support for any allegation that Zimmer would necessarily have the disagglomeration rate of the claimed invention.

As such, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 103(a).

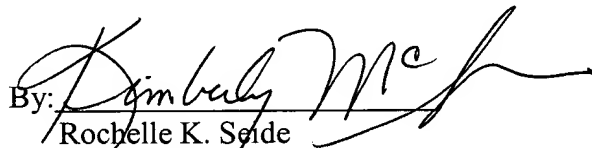
CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully request withdrawal of the outstanding rejections and allowance of the pending claims. Applicants do not believe that any fee, other than an extension of time fee, is required in connection with this submission. However, should any other fee be required, the Commissioner is hereby authorized to charge any such fee to Deposit Account 02-4377. Duplicate copies of this sheet are enclosed.

Respectfully submitted,

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EXHIBIT A

Marked-up version of the amended claims

10. (amended) A [modified] carbon black, characterized by:

- (i) being coated at least in part by a layer of aluminum oxide and/or hydroxide;
- (ii) having a specific BET surface area of between 30 and 400 m²/g;
- (iii) having an average particle size (by mass), d_w , of between 20 and 400 nm;

and [having an]

(iv) having an ultrasound disagglomeration rate, α , greater than $1 \times 10^{-3} \mu\text{m}^{-1}/\text{s}$ [, said rate being measured via an ultrasound disagglomeration test at 10% power of a 600 watt ultrasonic probe].

22. (amended) A process for reinforcing a diene rubber composition [which can be used for the manufacture of tires], comprising incorporating into the composition a carbon black [according to any one] of Claim 10 [into the composition by mixing in an internal mixer, before introducing a vulcanization system].

EXHIBIT B**Pending claims in Application No. 09/583,655 as of November 30, 2002**

1. A process for coating, at least in part, a carbon black with an adhering layer of aluminum oxide and/or hydroxide, comprising:

a) impregnating the carbon black with a colloidal suspension formed by hydrolysis of a solution of aluminum alkoxide in an alcoholic solvent.

b) removing the alcoholic solvent by evaporation; and

c) heat-treating the black thus impregnated so as to transform the aluminous layer present at its surface into an adhering layer of aluminum oxide and/or hydroxide.

2. The process of Claim 1, wherein the aluminum alkoxide is an alkoxide comprising 1 to 6 carbon atoms.

3. The process of Claim 2, wherein the aluminum alkoxide is selected from the group consisting of aluminum methoxide, aluminum ethoxide, aluminum (iso)propoxide aluminum butoxides, and mixtures thereof.

4. The process of Claim 1, wherein the alcoholic solvent is selected from the group consisting of methanol, ethanol, (iso)propanol, the various isomers of butanol, and mixtures thereof.

5. The process of Claim 1, wherein the colloidal suspension comprises nitric acid as a hydrolysis catalyst for the aluminum alkoxide solution.

6. The process of Claim 1, wherein the heat treating is carried out at a temperature of between 100 and 900°C.

7. canceled

8. canceled

9. canceled

10. (amended) A carbon black, characterized by:

- (i) being coated at least in part by a layer of aluminum oxide and/or hydroxide;
- (ii) having a specific BET surface area of between 30 and 400 m²/g;
- (iii) having an average particle size (by mass), d_w , of between 20 and 400 nm; and
- (iv) having an ultrasound disagglomeration rate, α , greater than $1 \times 10^{-3} \mu\text{m}^{-1}/\text{s}$.

11. The carbon black of Claim 10, wherein the disagglomeration rate α is greater than $1.5 \times 10^{-3} \mu\text{m}^{-1}/\text{s}$.

12. The carbon black of Claims 10 or 11, wherein the black has an amount of surface aluminum greater than 0.5% (% by mass).

13. The carbon black of Claim 12, wherein the amount of surface aluminum is between 0.5% and 5%.

14. The carbon black of Claim 13, wherein the amount of surface aluminum is between 0.5% and 3%.

15. A process for producing a reinforcing carbon black for tires, the carbon black having the following characteristics:

- (i) it is coated at least in part by a layer of aluminum oxide and/or hydroxide;
- (ii) its specific BET surface area is between 30 and 400 m²/g;
- (iii) its average particle size (by mass), d_w , is between 20 and 400 nm;
- (iv) its ultrasound disagglomeration rate, α , is greater than 1×10^{-3} $\mu\text{m}^{-1}/\text{s}$,

wherein said rate is measured via an ultrasound disagglomeration test of 10% power of a 600 watt ultrasonic probe;

the process comprising

- a) impregnating a starting tire-grade carbon black with a colloidal suspension formed by hydrolysis of a solution of aluminum alkoxide in an alcoholic solvent;
- b) removing the alcoholic solvent by evaporation; and
- c) heat-treating the black thus impregnated so as to transform the aluminous layer present at its surface into an adhering layer of aluminum oxide and/or hydroxide.

16. The process of Claim 15, wherein the starting carbon black is a reinforcing carbon black selected from the series 100, 200 or 300 (ASTM grades).

17. The process of Claim 15, wherein the aluminum alkoxide is an alkoxide comprising 1 to 6 carbon atoms.

18. The process of Claim 17, wherein the aluminum alkoxide is selected from the group consisting of aluminum methoxide, aluminum ethoxide, aluminum (iso)propoxide, aluminum butoxides and mixtures thereof.

19. The process of Claim 15, wherein the alcoholic solvent is selected from the group consisting of methanol, ethanol, (iso)propanol, the various isomers of butanol, and mixtures thereof.

20. The process of Claim 15, wherein the colloidal suspension comprises nitric acid.

21. The process of Claim 15, wherein the heat treating is carried out at a temperature of between 100 and 900°C.

22. (amended) A process for reinforcing a diene rubber composition, comprising incorporating into the composition a carbon black of Claim 10.

23. (new) The process of Claim 22, wherein the carbon black is incorporated in the composition by mixing in an internal mixer.

24. (new) The process of Claim 22 further comprising subsequently curing the composition by vulcanization.